

OBSERVATIONS

ON

Lateral & Angular Curvature of the Spine,

WRY-NECK, CLUB-FOOT,

AND OTHER ORTHOPEDIC AFFECTIONS;

WITH REPORTS OF CASES.

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OBSERVATIONS

ON

LATERAL AND ANGULAR CURVATURE OF THE SPINE,
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AFFECTIONS.

THE comparatively recent introduction of the practice of Orthopedy on a scientific basis, with the success which has attended its application in many cases hitherto abandoned by the surgeon as hopeless, renders it important, that, from time to time, a certain number of these cases, and an account of the success which has been the result of their treatment, should be taken from the case-book, and presented to the public.

The comparative ease, certainty, and permanence with which a cure can be effected in cases of this nature, particularly of club-foot, contracted limbs, &c. (species of deformity which are by far the most common), is a fact which is now thoroughly established in the mind of every well-educated physician and surgeon.

It is to the rescue of cases which have been, until the last few years, looked upon as beyond hope, that Orthopedy steps in and affords its aid; and it is also by its assistance that the child, as yet unconscious of the extent of its misfortune, is, by an early restoration to symmetry, saved for ever from a full realization of it. To describe numerous cases of this kind would be useless: it is necessary to mention particularly but two or three; the rest being, as it were, each a fac simile of the other, varied slightly by circumstances of time and treatment. These will be followed by a few examples of those more formidable malformations, which even an experienced

eye would be apt to regard as far too severe to be reached by human skill.

In connection with this report, however, it will, without doubt, be expected that some account should be given of the improvements that have been made and the measures that have been taken to render the Boston Orthopedic Institution as extensively applicable and as extensively useful as any other of a similar kind in the world.

Enlightened European surgeons, the most distinguished for their science and skill, have given to the subject of Orthopedy their interested and anxious attention. Thanks to the unwearied exertions of such men as Stromeyer and Dieffenbach, Guérin and Bouvier, Bonnet, Little, Blandin, Duval, Heine, and others, this branch of surgery has, to use the words of a distinguished writer, "progressed with a rapidity of which no other branch of surgery has ever offered an example."

The perseverance, energy, and accuracy with which the separate branches are pursued on the continent of Europe; the minute attention to detail with which, when once his attention is fixed, the Frenchman or the German follows up his subject,—have become proverbial, and have given rise to that perfection in the various departments for which they are so justly celebrated. It is this, together with the superior opportunities afforded in other respects for the investigation of disease, which renders a term of study in the French and German schools of so much importance to those who would become proficient medical and surgical practitioners.

A few years since, the junior surgeon of the Institution visited the extensive orthopedic establishments of England, France, and Germany; carefully examined the great variety of surgical instruments and apparatus there employed, and obtained descriptions, drawings, &c., of such as were thought most valuable, with a view to their introduction into our own country.

A few days passed with Professor Stromeyer in Freiburg, Germany, afforded an invaluable opportunity for obtaining information on this subject; and, apart from this object, his

distinguished attainments in every branch of surgery would alone render each hour spent in his society of immense importance to any one engaged in the same profession as himself. Diseases of the joints, dislocations, fractures, anchylosis, constitutional irritation, each received its due attention in the friendly instructions that fell from his lips; and each has, as is well known, received additional light from the science and talent which he has brought to bear upon it.

The immense establishment of Dr. Heine, near Cronstadt, Germany, also offered a most desirable means for improvement and study; and here, perhaps, a greater variety of surgical and mechanical apparatus is to be found than in any other place. One in particular, adapted to congenital and spontaneous luxations of the hip-joint, and also to fractures of the neck of the femur, demanded especial attention. Of this and some others, drawings were obtained.

These, together with establishments of a similar kind in Germany, attendance upon the lectures and cases of M. Guérin, and at the Bureau of Administration at the hours when MM. Bouvier and Duval were receiving patients, and also attendance at the Royal Orthopedic Hospital in London, of which Mr. Lawrence is consulting surgeon, and where Dr. Little and others have brought orthopedic practice to so great a state of perfection, afforded rare opportunities for improvement in this branch of the surgeon's art.

LATERAL CURVATURE OF THE SPINE, where one shoulder grows out, one side of the chest is depressed, and one hip is higher than the other, is very frequently acquired at school by sitting on seats which have no supports for the back, and writing at desks which are too high, or not adapted to the height of the occupants. For the cure of deformities of this nature, we make use of a great variety of apparatus, in the form of gymnastics, horizontal levers, spinal supporters, &c., &c. The spinal supporter is light, elastic, and easy, and fits well under the dress. No one appliance is, however, suited to all cases: they should be varied, and adapted to each

individual case, according as the peculiar circumstances may require. Although these instruments are important as auxiliaries, they never can be depended upon for the cure: other means are necessary in all cases. Guérin's sigmoid extension couch and other inclined planes we have made use of, and very much relied on, in our process of treatment: but the confinement to a horizontal position, so great a portion of the time, is irksome; and we have sought and now employ means which, in the majority of cases, are equally or more efficacious, without being open to the same objection.

In connection with this species of spinal complaint, may be mentioned others which depend upon a diseased and deranged condition of the spinal nerves.

Dyspepsia, palpitations of the heart, flatulence, affections of the bowels, of all the abdominal viscera, and of the upper and lower extremities, upon close examination, may be found to originate not unfrequently in some functional derangement of the spine. The anomalous complaints of young females, and also of boys, may be traced, very frequently, either to some affection of the great spinal nerve, the ganglia, or the nervous filaments that proceed from them.

There is no affection more common, as the consequence of spinal irritation, than a pain in the back of the head, confined principally to the scalp; and still we are not apt to look for its origin in the spinal nerves. Even a slight curvature produces a derangement in the nervous influence. An inclination of the bony column to one side, although it may be so slight as hardly to be perceptible, has its influence on the great spinal nerve. The spinal column cannot be altered (we mean permanently) from an erect position, without danger of disturbing the functions of some remote organ or part whose nerves are supplied therefrom.

We were called to a patient, not long since (a lad about fifteen years old), who had a variety of complaints not readily accounted for. His complaints were a painful affection of the eyes, palpitation of the heart, indigestion, a painful affection of the scalp, and a torpid state of the alimentary .

canal. We immediately examined the spine, and passed the finger up and down its whole length. We found two portions of it tender; viz., about the middle of the dorsal and the middle of the lumbar vertebræ. When we pressed on the transverse processes of the middle lumbar vertebræ, he invariably complained of pain in the abdomen. These circumstances convinced us that all his complaints proceeded from the spine; and we stated our conviction to the physician who had attended him. In the course of two or three weeks, three of the lumbar vertebræ began to project. They were evidently enlarged, probably from inflammation and swelling of the intervertebral substance. The attending physician was then convinced that all the complaints of this lad were caused by a disease of the spinal column, and the nerves that proceeded from it, affecting the remote parts and organs.

SPINAL CRIES, OR ANGULAR CURVATURE.

The amount of relief which may be obtained from a combination of mechanical with medical treatment in aggravated cases of scrofulous diseases of the spine, with or without angular curvature, is often greater than, *à priori*, we should have deemed possible. The following cases are extracted from our note-book, as among the most strongly marked and unpromising examples of this affection.

The first to which we would refer is that of a boy, eleven years of age, who came under treatment in February, 1847, and is thus described: "This patient has severe angular curvature in the lumbar region, by which he is much bent forward. In walking, he is obliged to put his hands upon his knees for support. His legs are exceedingly feeble. He is of a scrofulous constitution; light hair, light eyes, fair complexion. Grandmother died of phthisis. The disease of the spine was first noticed two years since. It cannot be traced to any injury. Two months since, had an attack of

fever, accompanied by costiveness, and by almost complete loss of power in his legs. At this time he had pain in urinating. There is fluctuation in right lumbar region, three inches from spine." The treatment consisted in the application of supports for the spine, combining their use with constitutional treatment,—iron, iodine, quinine, nourishing diet, friction, &c. The supports employed in this and similar cases are such as we have found, upon the whole, liable to the fewest objections, and the best calculated to fulfil the most important indications in this disease. They are so constructed that there shall be no pressure upon the chest. The ribs are left without the least impediment to respiration, and the shoulders drawn backward to enlarge the diameter of the thorax. By the same means, a slight degree of elastic pressure is made upon the projecting vertebræ; while the body is straightened, so as to prevent, as far as possible, the diseased and carious surfaces of bone from pressing against one another, and to relieve them of the superincumbent weight of the head and shoulders. Otherwise, of course, this weight upon the spongy and crumbling bone is constantly tending to increase the disease. Gentle exercise in the open air was permitted.

The memorandum of March 30th states "that the supports fit well, and the result is most satisfactory. The boy walks with his back comparatively straight, his head erect, and his whole appearance so altered that he would scarcely be recognized by one who had only seen him in his former bent position. His mother speaks of sending him to school. His general health is much improved." The record, six months later, states that "the boy is doing well, and is constantly at play in the streets with the other boys." In this case, as appears by the report, the protuberance was at once materially lessened by the mechanical support: he walked comparatively straight; and, at the last date, it seemed probable that ankylosis was taking place, by which return of the curvature would be prevented. Soon after this period, we lost sight of the patient.

Another case was from St. Johnsbury, Vt., treated in 1852: "Child, five years old. Has angular curve in dor-

sal region, implicating five vertebræ, — from the fifth to the eleventh. The spinous processes of the last two are in such close contact as to be liable to be mistaken for a single process. The shoulders are much raised; probably caused in part by the habit of relieving the back of the weight of the head and shoulders by throwing it upon the arms, resting either upon the thighs, upon a table, or arms of a chair, &c. The respiration most of the time, especially during sleep or when the mind is occupied, is noisy, amounting almost to a grunt. It is also, at intervals, apparently painful, particularly when attempting to take a long breath. He cannot draw a full inspiration. In October, 1850, he fell from a chair, and came upon the floor in a sitting position. His mother thinks he began to breathe badly from that time. The angular projection was first observed last winter" (1852).

The treatment was similar to that pursued in the case just cited, — supports adapted to the spine, rest a portion of the time in the recumbent position, friction with brandy and salt, and constitutional remedies. The apparatus supported the patient in an upright posture; the respiration became normal; and, by perseverance in the course prescribed, all the unfavorable symptoms gradually disappeared. This patient removed to Philadelphia. We received a visit, however, from him in 1854, two years after treatment, when he was in perfect health, with the exception of a slight ophthalmia. There were still some remains of the angular protuberance; but it had much diminished. He likewise again visited us in 1858, and was completely cured, with scarcely a trace of the deformity.

W. D., from Ellsworth, Me., a lad sixteen years old, was placed under our care for angular curvature of the spine. The curvature was in the lumbar region, near the sacrum. The two lower vertebræ protruded, and there was evidently a fluctuation, probably of serum. The parts were sensitive to the touch, and he was unable to bear riding. The motion of a carriage produced great uneasiness. This difficulty in the back had existed one year, and the lad was much reduced

by the pain and suffering which he had undergone ; had very little appetite, and was evidently falling away. Mechanical appliances were employed. His back was supported in such a manner as to relieve the tender spine of the weight of the head and shoulders. Constitutional remedies were prescribed in connection with iodine baths and a very generous diet. This course was strictly adhered to for six months, with great benefit.

The following extract from a letter by the young gentleman's mother, written some time after his return home, will give an idea of his present state of health : —

She writes, " We followed your directions until some time in the spring ; when his general health seemed so perfect, that he gave up taking the medicine entirely. His weight during the winter was a hundred and thirty-three pounds. He has rode every day. Sometimes he has rode twenty miles over our rough Maine roads ; which I should suppose would give his disease a trial. I often contrast last summer with the present : it seems almost a miracle that so severe a case as his could have been thus far arrested. Many that saw William last summer do not recognize him, but take him to be my oldest son. Last summer he was quite deformed ; but he is now very erect. He has so much vigor, that I am sometimes astonished."

A number of other cases could be cited, if it were deemed expedient, in which the result of the treatment here recommended was equally successful ; in some of which, complete paralysis of the lower limbs had existed for several months.

In caries of the vertebræ, the true principle, bearing in mind the state of the bones, is undoubtedly to treat the disease as a fracture, so far as this is possible, consistently with the health of the patient.

In the first place, the spine should be kept fixed, free from motion at the seat of disease. Second, the weight of the upper part of the body should be removed from the carious bones ; and these should not be allowed to come in close contact, otherwise absorption will be promoted. In this respect, the treatment, of course, differs from that pursued

where there is a simple solution of continuity in a healthy bone. While the anterior part of the bodies of the diseased vertebræ are thus relieved, gentle pressure may be made against the projecting spinous processes by means of a pad and spring. That instrument is the most appropriate which is modelled upon the above general principles, and which will best fulfil the indications that result from them.

The attempt to portray, by casts or drawings, the different stages of a complaint affecting a part naturally so flexible as the spine, is very unsatisfactory. They depend much upon the position in which the patient is placed at the moment, or upon muscular atrophy or development at different periods; and, if relied upon, they will tend to mislead both the physician and the patient, as well as others. It has, therefore, seemed best not to depend upon them in the description of a case.

Posterior curvature of the spine, where the bodies of several vertebræ have been especially affected by rachitic softening, and, being compressed by the weight of the upper part of the body, a corresponding projection of the spinous processes has resulted, may often be mistaken for that more fearful disease, caries. In such instances, complete cures may be effected, with no remains of the deformity, sometimes by very simple mechanical means, such as a figure-of-eight bandage around the shoulders, or other more complicated shoulder-braces.

Sir Benjamin Brodie, in speaking of this affection, says, "Nevertheless, I am satisfied that these different kinds of curvature, arising from different causes, have frequently been confounded with each other; and that some of the cases which have been published as examples of caries of the spine, and in which it may, at first, be a matter of surprise that so complete and speedy a cure should have been effected, have in reality been cases of an entirely different malady.* Dr. W. J. Little of London, whose experience in cases of this description is perhaps unequalled, likewise states that

* Brodie on the Diseases of the Joints, p. 254.

“rachitic posterior curvature may become angular in its progress.”*

In true caries, however, a very different method of treatment is required; and the relief which is afforded in a majority of instances — by following a course consistent with our knowledge of the pathology of the disease, sometimes resulting in a complete recovery, with more or less amelioration of the deformity — is a sufficient encouragement for its adoption in similar cases. So true is this, that whereas, some years since, we felt unpleasantly to see a case of this description, believing that art could accomplish but little for such a formidable malady, now, on the contrary, there is a satisfaction in undertaking the treatment; for, if a complete cure is frequently impossible, there is yet a strong probability that much suffering may be relieved and comfort attained.

As the diagnosis of spinal caries at an early period is confessedly very difficult, it is important to describe a symptom which will enable us to detect its existence at a stage prior to that where its disastrous results have become decidedly manifest, and which we have never seen noticed or referred to by any writer upon the subject.

Frequently, angular curvature is preceded by *incurvation* of the spine, usually in the dorsal region. The shoulders are thrown back; an exaggeration, in fact, of what is generally considered a characteristic of a fine figure. The child walks with his head and shoulders posterior to the median line. This is the reverse of what takes place later in the disease.

It seems probable that the condition here referred to may in part arise from a swelling of the bodies of certain vertebræ, particularly their anterior portion (this being the part usually found most extensively affected by caries), together with consecutive tumefaction of the intervertebral substance. We know that swelling of bone, and of the soft parts in its neighborhood, precedes carious disease in other parts of the frame. From analogy, we should expect that the pathology of spinal affections would correspond with that which exists elsewhere.

* Little on Deformities of the Human Frame, p. 350, note.

At the period, however, when we have an opportunity to examine the morbid appearances, they are often such as would lead to the conclusion that ulceration and softening of bone and cartilage are not always preceded by the usual characteristics of inflammatory action.

The description, nevertheless, which is given by Mr. Paget, of tuberculous disease, as it makes its first inroads upon the osseous structures, tends to sustain the views here advanced of the early pathology of spinal caries, as connected with one of its primary characteristic symptoms. He says, "The abundant deposit of tubercle, and the fulness of the vessels in the inflamed and softening bone, make the swelling in this form (the tuberculous) more considerable than in the preceding; yet it is rarely, if ever, great. . . . The changes produced by circumscribed tuberculous deposit in bone are comparatively seldom seen; for the disease is of slow progress, and rarely leads to death or amputation before the more diffuse ulceration has supervened and destroyed its characteristic features. The diffuse disease is, therefore, that which has been most studied, and which has supplied most of the examples of scrofulous caries, — 'Pott's disease of spine,' 'Pædarthrocæc.' It is this which is chiefly attended with ulceration, or perhaps tuberculous deposits in the neighborhood of diseased bones. . . . Inflammation indicated by all its signs is a common precedent and attendant of tubercular deposit."*

It is not improbable that this primary incurvation is very constantly present as the first indication of scrofulous spinal disease; but does not, in most instances, attract attention, or is regarded by the parents as a peculiar beauty in the form of their child, who is otherwise feeble and of a tuberculous diathesis.

It is evident that marked benefit must arise from the general recognition of this premonitory sign. The measures, hygienic and special, which the judicious physician will be led to adopt while the disease is yet in its incipient stage, we have a right to anticipate, may, in many instances, check the

* Surgical Pathology, pp. 682 and 683.

advance of the specific inflammation, and tend to remove the effects of that which has previously existed.

As the disease progresses, loss of substance takes place; the bone becomes converted into a spongy, brittle mass, and yields in the opposite direction. This formation of angular curvature sometimes occurs suddenly; there is an immediate breaking down anteriorly of bone, the normal texture of which has been gradually destroyed.

PARAPLEGIA EXISTING MANY YEARS.

COMPLETE RECOVERY.

A young lady, nineteen years old, was placed under our care for treatment, Jan. 25, 1854, with the above affection. The history of the case, as received from herself and her mother, who accompanied her, was as follows; viz.:—

In April, 1849, her mouth became very sore: knew no cause. Sick all summer, and very feeble; had no appetite, and could not walk without aid. The fall of same year, lost her sight and hearing. Had pain in her back during the summer: has not sat up or walked since,—now over four years. Catamenia regular. Used to have great pain in head. It was blistered many times; i.e., small blisters on the temples and forehead.

There is now a total loss of the use of the lower limbs; can use the hands and arms; cannot raise herself in bed, or sit up when raised; appetite pretty good usually; skin pale, and the countenance has a slight œdematous look; not much emaciated. She lives one hundred and twenty-five miles from Boston, and three miles from the railroad. She was brought these three miles on an ox-sled, on a bed, one of those cold days in January, 1854, when the thermometer was below zero. She had fixed on this day to come to Boston, and was determined the weather should not prevent.

Present symptoms, as exhibited on our first examination.

The toes on the right foot are permanently flexed and painful. The extensor longus digitorum pedis, and the extensor proprius pollicis pedis, when she makes an effort to raise the foot, exhibit a slight quivering: this is the only demonstration of the power of volition over muscles in any part of the limb. Both knees are contracted to an angle of thirty degrees, beyond which she has no power of extending them. The gastrocnemii are permanently contracted, and the feet very much extended, making almost a continuous line with the legs.

The nervous system is easily agitated: still her mind is firm and decided. Directed citrate of quinine and iron.

Feb. 3. — Placed her right knee in a stretcher such as we usually make use of, and applied a blister, five by twelve inches, to the lower part of the back. The bowels were extremely constipated: went frequently a week without a dejection. Directed the following medicine:—

℞ Pulv. aloes socot, ℥ii;
Aquaë, ℥vi;
Tinct. lavend., ℥ii; M.

Two teaspoonfuls operated favorably. She continued the medicine until the bowels became regular.

Feb. 7. — Placed left knee in a stretcher similar to the other, and administered electro-magnetism.

Feb. 18. — Have continued same treatment.

March 7. — She now, for the first time, states that she has been troubled with incontinence of urine for several years. Gave her tincture of cantharides, which produced scalding. It was discontinued, and injections *per vaginam* substituted, which gave her partial relief. She rides about the room in a wheeled chair. Continued same treatment, and gave strychnine, $\frac{1}{32}$ of a grain, morning, noon, and night.

March 27. — Patient's health has improved, but she does not recover the use of her limbs. The toes of the right foot are permanently flexed. This day, divided all the flexors; also the tendo-Achillis in each foot, both being strongly con-

tracted. This was done while she was under the influence of ether.

April 9.—The toes were separately bandaged to a piece of sole-leather, cut to the shape and size of the sole of the foot; slits having been cut through the leather, corresponding to the position of the toes. This was continued forty-eight hours.

The toes have not contracted since, nor given her any uneasiness whatever. She gives more evidence of the power of the will over the extensors of feet and toes. Increased strychnine to $\frac{11}{20}$ of a grain three times a day. Renewed tincture of iodine to back; other medicines continued.

May 9.—Exhibits more signs of voluntary motion in feet and legs. Still unable to retain urine.

June 9.—Continues to improve. Gave saturated tincture of ergot, thirty drops three times a day. Discontinued electro-magnetism, which she has been using for some weeks past.

July 9.—Legs, feet, and toes continue straight and natural. Motion improves. Increase ergot to forty drops three times a day.

July 15.—The ergot produces pains simulating labor-pains. Went back to thirty drops; omitted citrate of quinine and iron, and gave wine of iron instead.

Aug. 9.—Has been gradually improving in health and in the command of her limbs and urine since last date. She begins to exercise her legs by sitting on a bed or table, and swinging them back and forth. Re-apply tincture of iodine to back.

Sept. 9.—Bodily health as at last date. Voluntary motion of legs and feet gradually increasing. Begins to stand on her feet, and walk a little when supported by her sister.

Oct. 9.—Continues to improve; walks, and bears her own weight, by taking hold of the furniture in the room. Ergot continued and solution of quinia.

Nov. 9.—Discovered that she had of late been very imprudent in her diet: this has caused dyspepsia, and, without doubt, has retarded her progress. Put her on a light diet. She has drunk wine or brandy and water with her dinner ever since she has been under my care, and still continues to do so.

Nov. 17. — Renewed strychnine in the following formula: —

℞ Strychniæ, gr. i ss.;
 Alcohol, ℥ ss.;
 Acidi acetici, q. s.; M.

Give three drops twice a day. Give two grains quinine twice a day. Cannot yet fully command the urine.

Feb. 20, 1855. — It is now three months since the last report. The young lady has returned home, quite well. The last nine months of the time she was under treatment, she was with her sister at East Cambridge. Owing to her helpless condition, and amiability of character, much sympathy was excited in her favor. The neighbors took much interest in her; visited her often; brought her books, flowers, &c.

Before she left for home, she returned their calls on foot, and walked into Boston to call on us. We have repeatedly heard from her since her return home. She lives among the granite hills of New Hampshire.

TREATMENT OF CLUB-FOOT.

The treatment of club-feet is surgical and mechanical. The division of those tendons, fasciæ, &c., — the contraction of which is the cause of this deformity, and keeps the foot in its abnormal position, — is, in general, a prerequisite step. This, however, is but a small part of the process of cure. The subsequent treatment is considered, by all who have paid much attention to the subject, as much the most difficult and tedious part to accomplish; and, on an average, it requires between two and three months' daily attention and manipulation to effect a complete restoration of the foot.

Occasionally feet are cured in a less time, but generally

they require ten or twelve weeks; and it is important that the mother, or nurse, who has the care of the child during treatment, should be faithful to the trust. Any neglect or deviation, such as suffering the apparatus to get displaced, and letting it remain so for twenty-four hours, might change the whole aspect of the cure. At any rate, it would probably retard the process for a week at least.

We have had many club-feet that had been operated on *unsuccessfully* by other practitioners, some of whom rank high in the public estimation as surgeons. A great variety of apparatus is essential in the treatment of club-foot in its various forms: such as varus, valgus, equinus, and calcaneus, or a combination of these; equino-varus, equino-valgus, calcaneo-varus, calcaneo-valgus, &c. These deformities run into each other, and it is sometimes difficult to tell which is the most prominent feature of the deviation. Then, again, paralysis of some of the muscles adds to the difficulty of treatment, and requires more complicated apparatus. The first case published, as having been operated on, in New England, was done by the senior surgeon of this Institution, Feb. 21, 1839. The subject was a little girl, three years old.

CASES OF TALIPES, OR CLUB-FOOT.

W. F., jun., aged six, was brought to the Institution by his father, W. F., who himself has double varus of the third degree. W. F., jun., the lad now brought for treatment, has double varus of the third degree. He walks on the upper side of the os cuboides and the lower end of the fibula,—that is, on the top of the foot and outer ankle; and a large callus, or cushion, is formed at this spot, on both feet.

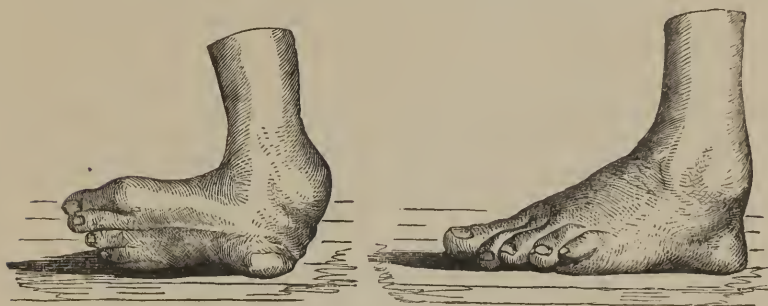
This lad remained under treatment about eight weeks, and, owing to a want of pecuniary means, could not remain longer.

He was not entirely cured ; and, the next year, was put under treatment again. The result may be seen in the following engravings. The feet were almost precisely alike before treatment, and the cure in both was equally perfect. On this account, the representation of but one foot is given.

Fig. 1 represents the patient's feet when he first came under treatment. It so happened, that the second casts of the feet, of which these engravings are copies, were not taken until twelve years after they were cured.

FIG. 1. — Before treatment.

FIG. 2. — After treatment.



This young man has recently visited Boston, and his feet are perfect both in form and in freedom of action. Many of the intervening years he has passed as a sailor, before the mast ; and he states that he has never experienced any inconvenience from his feet, whether on land or sea. When last heard from, he had been promoted to the office of captain's mate.

This case is here mentioned as one of numerous examples that might be cited, which have presented themselves some ten or twelve years after restoration, where the strength of re-united or new tendon had been rigorously tested, and where the perfection and permanence of the cure was strikingly exemplified.

In this connection, we will refer to one other similar case. It is that of a young man, son of a clergyman, who was treated in another city for club-foot when a child, but

who came to Boston some years since, with his difficulty still unrelieved. The foot was here completely cured. A short time since, he again visited Boston. He was now an intelligent, active young man. He had been through college. The foot which had been operated on could not be distinguished from the one which had always been perfect. All the natural movements of the foot, flexion and extension, abduction and adduction, were freely and actively performed. He had finished his education as an engineer, and had been engaged in his profession a year or more. During the last eight months of the year 1856, he walked ten hundred and ninety miles, carrying his apparatus and wheeling his odometer.

The following cut (see Fig. 3) is the model of the left foot of a lad, thirteen years of age, who was under treatment some years since. A more formidable case of distortion can hardly be imagined. If it were not identified by the toes, we could scarcely recognize it as the representation of a human foot. The metatarsus was doubled and twisted upon the tarsus in a most remarkable manner; forming, at the point of union, a sharp prominent ridge upon the top and side of the foot. The astragalus was luxated upward and outward, and very much diminished in size. The atrophy of this bone produced one of the greatest difficulties with which we had to contend in the treatment. In the process of cure, as the foot advanced towards its normal position at a right angle with the leg, it was almost impossible to retain the astragalus in its proper situation. It constantly slipped forward, tending to completely defeat the successful issue of the case. The toes were flattened backward to such an extent as to be partially in contact with the dorsum of the foot, the little toe being pressed back against the top of the metatarsal bone of the fourth toe. There was, in addition, a contraction of the left leg at an obtuse angle with the thigh.

The next cut (see Fig. 4) is the same foot after treatment. It will be observed that they are moulded with great accuracy; the one last taken exhibiting the wrinkles in the

skin where it had formerly been stretched over the projecting astragalus and tarso-metatarsal prominences. It will also be seen that this does not represent a foot which is in all respects perfectly formed. When compared with its previous state, however, the improvement may be considered as being at least equal to the anticipations of the most sanguine.

It may be stated that the pencil-sketches of the casts from which the annexed engravings were copied were drawn with great exactness; and for truth of detail, and finished execution, can scarcely be excelled.

FIG. 4. — After treatment.

FIG. 3. — Before treatment.



In the course of the treatment, there were four sections of the tendo-Achillis. The union of this tendon advanced more rapidly than the foot could be proportionably straightened, and only a limited increased length of tendon could be acquired before firm union took place; presenting, after a short time, an unyielding obstacle to further progress. Re-division, therefore, became requisite in order to render continued extension possible.

Experiments upon animals, combined with previous experience, should be our guide in difficult and extraordinary cases. The former prove that divided tendon is re-united in about three weeks by a firm, fibrous tissue, presenting considerable force of resistance; and that, in five or six weeks, it is perfectly continuous and inelastic. Still later, it becomes more solid than the original tendon.

The other parts divided, in this case, were the *tibialis anticus*, the *adductor pollicis* (the latter twice), the *flexor longus pollicis*, and some fasciculi of the plantar fascia; also the *semitendinosus*, the *semimembranosus*, and the *biceps*.

The treatment resulted in a complete restoration of the leg; and the foot is now, we have been informed, in a more perfect condition than is represented by the cast or the engraving.

Figs. 5 and 6 represent a case of equino-varus, in which the patient walked upon the extremities of the metatarsal bones. The toes were pressed back; the metatarsus flexed and rotated upon the tarsus; the astragalus, as may be distinctly seen upon the model, was thrown out, and projected upon the *dorsum pedis*, with the bones of the leg resting upon its posterior portion and upon the *os calcis*. The heel was elevated three inches and a half. The patient was a boy, eleven years of age. The foot was discovered to be misshaped as soon as he began to walk, and was probably

FIG. 5. — Before treatment.



FIG. 6. — After treatment.



congenital equinus, converted, by pressure in walking, into equino-varus. The parts divided were an adventitious ligament, broad, thick, and unyielding, which extended from the *os calcis* to the base of the great and second toes, — this was formed, probably, from the plantar fascia, — the *flexor longus pollicis* and the *tendo-Achillis*.

This case was remarkable, not only for the severity of the distortion, but also, considering the age of the patient, for the unusual rapidity of the cure. The operation was done on the 22d of September. On the 30th, the toes were straight, the foot at a right angle with the leg; and the patient, for the first time in his life, could place his heel upon the floor. Fig. 6 is the same foot after treatment.

The following case is remarkable only on account of the age of the patient; being the oldest ever operated upon for the cure of club-foot, so far as known, either in this country or in Europe.

Mrs. S. of Boston, aged seventy-three, was attacked with hemiplegia, the left side being affected. She partially recovered the use of her arm and leg. Certain muscles, however, were permanently contracted, and remained so after a lapse of two years. These were the flexors of the fingers, the gastrocnemii, and the tibialis anticus. The fingers were so much contracted (and still remain so) as to keep the hand nearly closed: still she has the use of the arm. By the contraction of the gastrocnemii and the tibialis anticus, the heel was elevated, and the foot turned in towards the other; forming that species of club-foot called *talipes equinus varus*, of the second degree. When she attempted to walk,—which she could only do by assistance,—the weight of the body came upon the outer margin of the anterior portion of the metatarsal bone of the little toe. This became very sore. She had, besides, constant pain in the whole of her foot, which had existed for two years. She consulted her physician and Dr. Bigelow. They stated to her that they thought favorably of an operation; and advised her to consult us, which she did. Our only doubts were, whether, at her advanced age and in her feeble state of health, the tendons would unite if divided. We, however, made up our minds that dividing the tendons would relieve the pain, from which she had been a constant sufferer for two years; and again, that, if the tendons never united, we could put on an apparatus which would enable her to walk much better than she then did. Accordingly, we

divided the tendo-Achillis and the tibialis anticus. We applied our usual apparatus. In a few days, the pain in the foot was relieved, and, in the course of a fortnight, entirely left her. The tendons are united, and she walks with ease. Her health has improved, and she has gained flesh, as is remarked by all her acquaintance.

It will be perceived in this drawing that the leg makes an acute angle with the foot. This shows that the ankle-joint has its free and natural motion. It is a mistaken notion that a foot is cured when brought into a line parallel with the leg, laterally, even if it can be flexed to a right angle with it. It may appear very well as the patient stands, but very awkward when he walks. Hence it is that feet

FIG. 7. — Before treatment.



FIG. 8. — After treatment.



which have been cured in this way (and many such have been reported) will, after being walked upon a short time, revert to their pristine obliquity, or nearly so. The importance of the free use of the ankle-joint, and the necessity that the foot should be capable of performing an acute angle with the leg, have not been noticed by writers on the cure of club-foot with sufficient emphasis; and, in fact, we do not recollect any author who has mentioned it at all.

Fig. 7 represents the foot as it was before treatment.

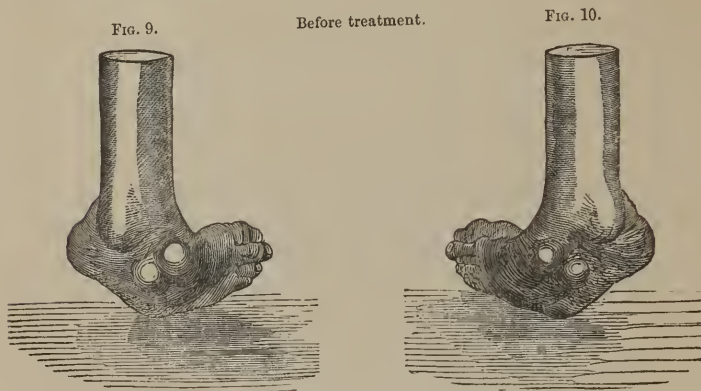
Fig. 8 represents it as it now is.

One other example of talipes, or club-foot, will be here cited. We copy from a report of the case which was read before the Boston Society for Medical Improvement, when the patient, with his cured feet, was present; and which was published a few weeks since in the "Boston Medical and Surgical Journal." The patient is from Detroit, Mich.; and is now nine years of age. The efforts of his parents, from the time of his birth to the present, have been unwearying to obtain a cure of the deformity; and no expense or pains have been spared. The following extracts from a letter written by the boy's mother, previous to his coming to Boston for treatment, give a brief history of the case up to that time:—

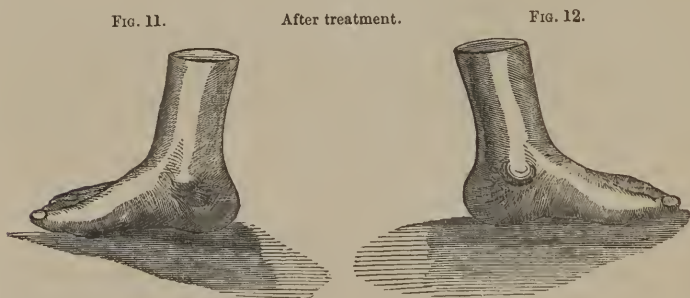
"Our boy was born with both feet very badly misshapen. At the age of eight months, he was operated upon by a surgeon, who divided the tendon of the heel, and the ligament in the hollow of the foot; . . . but the feet remained the same as at first. At the age of two years and four months, the child was operated upon again by a surgeon, who was confident of success; and he remained under his care two years, during which time the tendo-Achillis and the ligament on the inside of the foot were cut five times each, making ten incisions in the two feet. All sorts of apparatus were used, from a single splint to a harness reaching from the waist to the toes, weighing not much less than five pounds. Chloroform was administered during the cutting, and paregoric and opium without stint given, to enable the little sufferer to bear his torture. At the end of two years, his health seemed to be giving way; and we released him from the stocks. That he lived through all, seems a wonder; that his temperament should be nervous and his disposition irritable, seems but natural. He is now eight and a half years old; his feet are as bad as ever they were, I think; and, notwithstanding our hard experience, we are anxious to place him under your care, in case you could encourage us to believe that he could be made better."

The two first figures are from the moulds of this boy's feet, taken when he first came under our treatment. (See Figs. 9 and 10). It will be seen that they present some unusual peculiarities, consisting chiefly in the rounded, marble-like

prominences standing out upon the dorsum or top of the feet, and in the marks of the cicatrices and adhesions which were



formed between the skin, fascia, tendons, and cellular tissue at the place of the early operations, all of which are well represented by the casts. The feet were completely turned inward, and rotated on their own axes; and the patient, in walking, threw one over the other, as is usual in such cases.



The left foot was cured, or nearly in the condition here shown, in about six weeks. (See Figs. 11 and 12.) In the right, however, the cicatrices and adhesions above referred to were far more rigid and unyielding.

The free and persevering use of a strong mercurial ointment appeared to have a decided effect in producing absorption and softening of these results of inflammation; and the

member was gradually brought to its present state, which, it will be seen, is that of a perfect foot. The appearance and shape of the members, and the action of the joints (which last is, in all these cases, the most difficult to acquire), will be found, upon examination, to be equal to that of feet which have never been malformed.

As an additional indication of the completeness of the cure which had been effected in this lad's feet, we make the following quotation from a letter received from his mother since his return home :—

“I cannot allow another day to pass without expressing to you my gratitude that I am allowed to see my dear little boy at home again, so perfectly cured of his dreadful deformity. When I look at J.'s feet, I can hardly believe that he is the same little fellow that I placed under your care. Our friends, many of whom have seen him already, think it almost a miraculous cure, and express the greatest astonishment and admiration at his feet. As for ourselves, it seems as if we could not be thankful and happy enough. We look at him daily with wonder and gratitude, when we think that we took him to you, a poor crippled creature, more than half dreading lest we were making another useless experiment, — now so well, so happy. I don't know that any words of mine can express our feelings of gratitude towards you.”

The less common form of club-foot is that in which the foot turns out instead of in. This often occurs from an injury to the ankle, at other times from paralysis; and likewise a child is sometimes born with it. The following case arose from the cause first mentioned :—

June, 1853. — F. P., aged sixteen years, had an injury of the right foot and ankle some three years since, by which he was confined to the house some months. The foot turns out so much, that he walks upon the inner edge; the interior ankle projects, and there is tenderness about its joint. The muscles on the outer side of the leg, ankle, and foot, and the flexor of the toes, are contracted. These muscles were all divided, and the foot placed in an apparatus. In six weeks, this patient went home with a perfectly straight foot. He was directed to wear a support for a short time.

In the fall of 1859, F. P. visited Boston to enter into business or to obtain employment. His foot is in all respects perfect both in form and in usefulness.

The second-mentioned cause of this species of club-foot (namely, from paralysis) may be exemplified by the following case :—

L. B., aged nine years, had a severe attack of illness when three years of age. When she began to walk, a lameness was discovered. She was brought to us in Boston, in February, 1859. The right foot hung off from the leg, as though merely attached by the skin. It turned completely outwards; and, in walking, appeared to be useless; or, in truth, seemed rather an impediment to locomotion, as the inner ankle and the part immediately around it came upon the ground, and bore the weight of the body.

This little girl was some months under treatment; and went to her home, in the West, with a handsome foot. She walks firmly on the sole; and has regained power in the paralyzed muscles, an ankle-support being now all that is needed.

In regard to the species of deformity now referred to, which commences previous to or at birth, we will simply say, that although not so common as the others, yet they very frequently present themselves. These cases may be exemplified by those which we have already mentioned as in the method of treatment; and, in the results which follow, they do not materially differ.

TALIPES EQUINUS, FROM INJURY OF THE CALF OF THE LEG.

In the following case, there was nothing peculiar in the treatment, or in the success with which it was followed; but we think it may be interesting from the singularity of its origin. The subject was a lad, eighteen years of age.

When eleven years old, he was sent on an errand to a mill or factory. In looking about the machinery, he made an attempt to step over a shaft which was turning very rapidly. Some projecting bolts near the coupling caught in his pantaloons, and he was whirled around with the shaft until the mill was stopped. It was found, on examination, that a great portion of the gastrocnemii muscles of the left leg had been torn off, and the bone laid bare for some inches. The father of the young man represented the part which was abraded, and torn away, to have been as thick and as large as his hand.

The surgeons brought together the jagged fragments as well as they could by stitches and adhesive plaster; but, during the process of cicatrization, the heel was drawn up so as to make almost a continuous line with the tibia and fibula. The heel stood five inches from the ground when we first saw the young man; and he walked entirely on his toes and the anterior ends of the metatarsal bones, which he had done from the time of the accident, seven years previous. The operation was on the 8th of September, 1859; and, in three weeks, the foot had acquired its normal position, as seen in Fig. 14, with a free and complete use of the ankle, and all the functions of the foot restored. When brought to us, the foot was as represented in Fig. 13. Although, in this case, the foot had regained its natural and relative position in three weeks, the young man did not return home until about six weeks from the time he came, as we thought it best to continue the application of the apparatus.

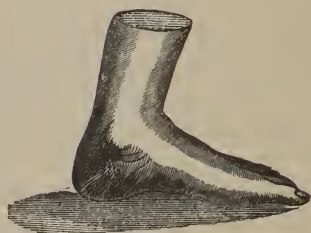
It is now about three weeks since he left the city; and he writes that he walks, runs, and skates with perfect ease. The appearance of the leg exhibits a peculiar state of the gastrocnemii, when they contract in the act of walking. The different portions of muscle that remain seemingly act distinctly, but synchronously. There is a fasciculus of fibres, on the inside of the leg, which was left entire, from its origin to its insertion. The tendo-Achillis is entire, with a portion of muscle below the cicatrix. This latter has no insertion except into the cicatrix, and perhaps an unnatural adhesion to the bone.

These separate portions of the muscles all act in concert in propelling the body forward.

FIG. 13. — Before treatment.



FIG. 14. — After treatment.



TORTICOLLIS, OR WRY-NECK

Wry-neck is a species of deformity which is somewhat more rare than the preceding. We will cite the following as an instance of this affection :—

Miss C. was placed under our care for wry-neck and lateral curvature of the spine. The spinal curve was a consequence of the distortion of the neck. The head was inclined to the right shoulder, and the chin drawn towards the left. This patient had suffered from severe rheumatic fever some months previously; during which the cervical vertebræ had been particularly affected, and the neck was left in a permanently twisted and curved state. There was no contraction of the muscles, the disease having produced a thickened state of the intervertebral substance, and an apparent enlargement of one or two of the vertebræ. This patient is perfectly restored, and only by very careful observation can the least trace of her former difficulty be discovered. She has recently been married.

Other examples of this deformity, of equal importance and interest, we omit, as the similarity of the cases and of the treatment would perhaps render them tedious.

FALSE ANGULAR ANCHYLOSIS OF THE KNEE,
WITH DISLOCATION OF THE TIBIA ON THE FEMUR.

Case of Charles —, son of Mr. —, of New York.

The right leg was drawn up, making an acute angle with the thigh. Between three and four years since, he had suffered from scrofulous disease of the joint. There was a partial dislocation of the tibia backwards. Extreme tenderness still remained about the joint. A line, drawn from the great trochanter to the external malleolus, measured twelve inches only.

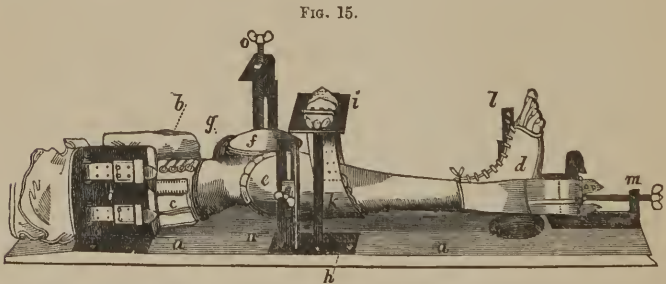
Sept. 20. — The semi-tendinosus, semi-membranosus, and the biceps were divided. Drs. J. C. and J. M. Warren were present at the operation. An apparatus, fitted accurately to the limb, and capable of producing very gradual extension, was applied. During the progress of extension, great care was taken that the lever-power, which such instruments are capable of exerting, should not act in such a manner as to throw the head of the bone still further backwards. This accident has frequently occurred in the practice of surgeons, when treating this deformity. The apparatus was therefore so arranged as to tend to reduce the partial dislocation, at the same time that the limb was straightened.

The leg improved rapidly; and, at the expiration of one month from the time of the operation, the space from the trochanter major to the external malleolus had increased five inches, and the tenderness had greatly lessened. The leg continued to improve until Dec. 26, when the patient returned to New York to pass a couple of weeks with his friends. During this period, of course it was impossible that he should be watched with the same care as when under our own immediate observation; and, on his return, we found that an almost complete dislocation had taken place. The head

of the tibia was thrown back into the popliteal space, and there was very great prominence of the lower extremity of the femur. The sensitiveness around the joint had also much increased. Leeches were applied to reduce the inflammation; afterwards antimonial ointment, a solution of nitrate of silver, and the douche, were resorted to. These applications produced great relief from pain, and also removed, to a considerable extent, the sensitiveness of the joint.

After this preparatory treatment had been vigorously enforced, and its object attained, our aim, of course, was to restore the bones to their normal position. To effect this, we administered chloric ether, until the little patient was completely under its influence, and totally insensible. Extension and counter-extension were then used, by means of pulleys, to separate the extremities of the bones; and then, by applying Dr. Little's very ingenious and useful apparatus for affections of the knee, we were enabled on the first trial partially, and on the second, made a few weeks later, entirely, to remove the dislocation; and, at the same time, the leg was almost completely straightened.

Fig. 15. — Appearance of the leg during treatment, with a representation of Dr. Little's apparatus.



No inflammation or other ill effects resulted from this operation: on the other hand, the tenderness was less; and the patient was enabled to use the limb as soon as we considered it consistent with safety to do so. He now placed the whole foot fairly on the ground, and walked with but a slight limp, which was the consequence of the limb being from one to two

inches shorter than the other. This shortening, or more probably this "arrest of development," always takes place when a limb is from any cause kept for any length of time in a state of inactivity, and can only be remedied, in a majority of instances, by the boot being made with a sole of sufficient thickness to render both legs of equal length. Charles was now enabled to throw aside his crutches, without which, for a great length of time, he had not been able to walk a step; and with the assistance of at first two canes, and afterwards of but one, to go about with comparative ease and freedom. There has never been any return of the dislocation; and, with proper care, the leg will, no doubt, continue to improve, and be as useful, and, as the muscles become developed from exercise, as well proportioned, as the other. We have heard recently that he walks perfectly well.